USDA Natural Resources Conservation Service

Ecological site R085AY563TX
Shallow Clay 30-38" PZ

Last updated: 9/21/2023
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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 085A–Grand Prairie

The Grand Prairie MLRA is characterized by predominately loam and clay loam soils underlain by limestone and shale. Topography transitions from steeper ridges and summits of the Lampasas Cut Plain on the southern end to the more rolling hills of the Fort Worth Prairie to the north. The Arbuckle Mountain area in Oklahoma is also within this MLRA.

Classification relationships

This ecological site is correlated to soil components at the Major Land Resource Area (MLRA) level which is further described in USDA Ag Handbook 296.

Ecological site concept

These sites occur on shallow heavy clay soils on uplands. The soils can be drouthy due to the clay content. The reference vegetation consists of native midgrasses with mixed forbs and very few shrubs.

Associated sites

R085AY177TX	**Blackland 30-38" PZ** The Blackland sites occur over deeper clay soils on lower landscape positions.

Similar sites

R085AY189TX	**Very Shallow 30-38" PZ** Very shallow soils over limestone or caliche.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Bouteloua curtipendula* (2) *Schizachyrium scoparium*

Physiographic features

This site occurs on interfluves of hillslopes in the Grand Prairie. Slopes are typically 3 percent or less.

Table 2. Representative physiographic features

Landforms	(1) Hills > Ridge (2) Hills > Hillslope
Runoff class	High to very high
Elevation	152–381 m
Slope	0–3%
Aspect	Aspect is not a significant factor

Climatic features

The climate is subhumid subtropical and is characterized by hot summers and relatively mild winters. Tropical maritime air controls the climate during spring, summer and fall. In winter and early spring, frequent surges of Polar Canadian air cause sudden drops in temperatures and add considerable variety to the daily weather. The average first frost should occur around November 5 and the last freeze of the season should occur around March 19.

The average relative humidity in mid-afternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 75 percent of the time possible during the summer and 50 percent in winter. The prevailing wind direction is from the south and highest windspeeds occur during the spring months.

Approximately two-thirds of annual rainfall occurs during the April to September period. Rainfall during this period generally falls during thunderstorms, and fairly large amounts of rain may fall in a short time. The driest months are usually July and August.

Table 3. Representative climatic features

Frost-free period (characteristic range)	194-208 days
Freeze-free period (characteristic range)	216-243 days
Precipitation total (characteristic range)	813-965 mm
Frost-free period (actual range)	190-209 days
Freeze-free period (actual range)	209-245 days
Precipitation total (actual range)	787-991 mm
Frost-free period (average)	201 days
Freeze-free period (average)	230 days
Precipitation total (average)	889 mm

Climate stations used

- (1) BENBROOK DAM [USC00410691], Fort Worth, TX
- (2) CLEBURNE [USC00411800], Cleburne, TX
- (3) WHITNEY DAM [USC00419715], Clifton, TX
- (4) DENTON MUNI AP [USW00003991], Ponder, TX
- (5) DECATUR [USC00412334], Decatur, TX
- (6) EVANT 1SSW [USC00413005], Evant, TX
- (7) BROWNWOOD 2ENE [USC00411138], Early, TX
- (8) LAMPASAS [USC00415018], Lampasas, TX

Influencing water features

These sites shed some water to adjacent areas downslope. The presence of deep rooted tall and midgrasses aid in percolation of rainfall into the soil. However, permeability on these sites is usually slow due to the clay soils. They are not typically associated with wetland sites.

Wetland description

NA

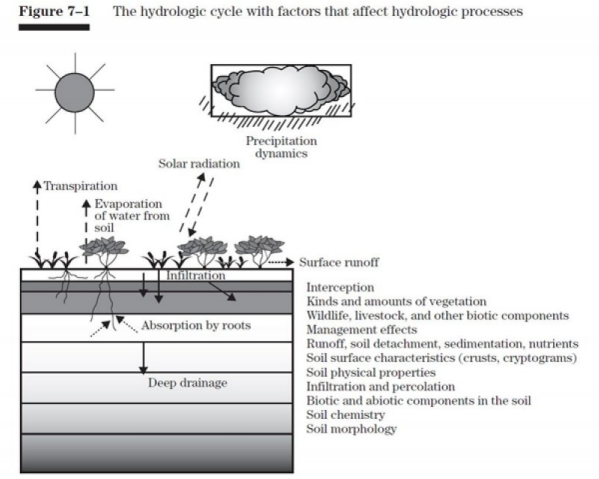


Figure 8.

Soil features

Representative soil components for this ecological site include: Oglesby

The site is characterized by shallow, well drained, slowly permeable clayey soils with high shrink swell potential.

Table 4. Representative soil features

Parent material	(1) Residuum–limestone (2) Residuum–mudstone
Surface texture	(1) Gravelly silty clay (2) Clay (3) Silty clay
Drainage class	Well drained
Permeability class	Slow
Soil depth	25–51 cm
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0–10%
Available water capacity (0-101.6cm)	7.62–10.16 cm
Calcium carbonate equivalent (0-101.6cm)	0–5%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–1
Soil reaction (1:1 water) (0-101.6cm)	6.6–7.8
Subsurface fragment volume <=3" (Depth not specified)	0–20%

Subsurface fragment volume >3" (Depth not specified)	0–10%

Ecological dynamics

The reference plant community for the Shallow Clay ecological site is a midgrass/shortgrass prairie with a scattered but diverse forb component, very few shrubs, and only an occasional hackberry tree.

This Shallow Clay site was historically dominated by sideoats grama (*Bouteloua curtipendula*) along with other midgrasses and shortgrasses including meadow dropseed (*Sporobolus compositus* var. drummondii), Arizona cottontop (*Digitaria californica*), vine mesquite (*Panicum obtusum*) Texas wintergrass (*Nassella leucotricha*), cane bluestem (*Bothriochloa barbinodis*), silver bluestem (*Bothriochloa laguroides*), hairy grama (*Bouteloua hirsuta*), buffalograss (*Bouteloua dactyloides*), and curlymesquite (*Hilaria belangeri*). Little bluestem (*Schizachyrium scoparium*), was also a significant component of the plant community in its original pre-settlement state.

Forbs were scattered throughout the site. The most common forbs were heath aster (*Symphyotrichum ericoides*), gayfeather (*Liatris punctata*) plains blackfoot (*Melampodium leucanthum*), Leavenworth eryngo (*Eryngium leavenworthii*), American basketflower (*Centaurea americana*), beebalm (*Monarda pectinata*), and curlycup gumweed (*Grindelia squarrosa*).

Shrubs and trees were a very minor component of the original reference plant community on the Shallow Clay site. Bumelia (*Sideroxylon lanuginosum*), lotebush (*Ziziphus obtusifolia*), Catclaw acacia, (*Acacia greggii* var. greggii), pricklypear (Opuntia spp.), tasajillo (*Cylindropuntia leptocaulis*), yucca (Yucca spp.), and mesquite (*Prosopis glandulosa*) are shrub species that sparsely populated the historic site. Hackberry (Celtis spp.) was the only significant tree species that was occasionally found on the site.

Fire was an integral part of the ecosystem. Historic fires on this site were not as frequent or intense as they were on most associated sites because of the structure of the vegetation, and the relatively low amount of fine fuel to sustain the fires. The shorter height of the grasses and the scarcity of forbs and woody plants contributed to these less intense fires. However, fires of moderate to low intensity did play a key role in refreshing and reinvigorating the old growth vegetation and keeping weeds and brush species suppressed. Lack of fire allows herbaceous vegetation to become senescent and may eventually lead to the loss of the most desirable species. Seedlings of non-native brush species and invasive weeds may encroach on the site from adjacent sites.

Prior to settlement, this site was subject to periodic grazing and browsing by vast herds of bison, wild cattle, wild horses, and deer. At times these grazing and browsing episodes were intense and severe, but periods of heavy use were followed by long periods of non-use as the herds migrated to fresh grazing areas before returning to previously grazed areas. The grazed areas had an opportunity to rest, regrow, regain vigor, and reproduce prior to the next grazing event. Intervals between grazing periods were frequently influenced by the amount of time that had elapsed since the last fire on the area.

As the region was settled, fire was reduced or eliminated and grasslands were fenced off to control movement and facilitate grazing by domestic livestock. As a result of abusive grazing or lack of grazing and/or the elimination of fire, in association with extreme climatic events, the historic plant community has been altered on most Shallow Clay sites.

Climate is a major factor influencing vegetation on the site. Precipitation patterns are highly variable. Long-term droughts, lasting multiple years occur only three to four times per century, but when they do occur they result in shifts in species composition by causing die-off of seedlings and less drought-tolerant species. Droughts also reduce biomass production and create open space, which is colonized by opportunistic species when precipitation increases. Wet periods allow midgrasses to increase in dominance. If abusive grazing occurs during or immediately following the drought period, the results can be devastating. The effects of erratic seasonal moisture and short-term dry spells lasting a few months are not as severe as those caused by long-term droughts. However, the lower the ecological status of the site at the time of overgrazing, the greater the negative impact will be during drought periods regardless of duration. Deterioration of the site because of uncontrolled grazing, extreme weather conditions, and other disturbances results in the loss of most of the late successional species.

Because of the dense clay subsoils, ponds and dams are often built on this site. The Shallow Clay site is frequently

overgrazed because it may be the only location with surface water in a pasture. The site is usually very slow to recover from overgrazing because of its dense, shallow soils. As the midgrasses decrease on the site, they are replaced by early successional midgrasses, a significant increase in the shortgrasses, as well as annual grasses and forbs.

Further deterioration leads to the loss of the perennial midgrass plant community as shortgrasses, annual forbs, and annual grasses, begin to dominate the site. If disturbances are severe enough for an extended period of time, annual species dominate and bare ground is extensive. This provides the opportunity for less desirable woody species such as mesquite, lotebush, pricklypear, and tasajillo to encroach from adjacent sites.

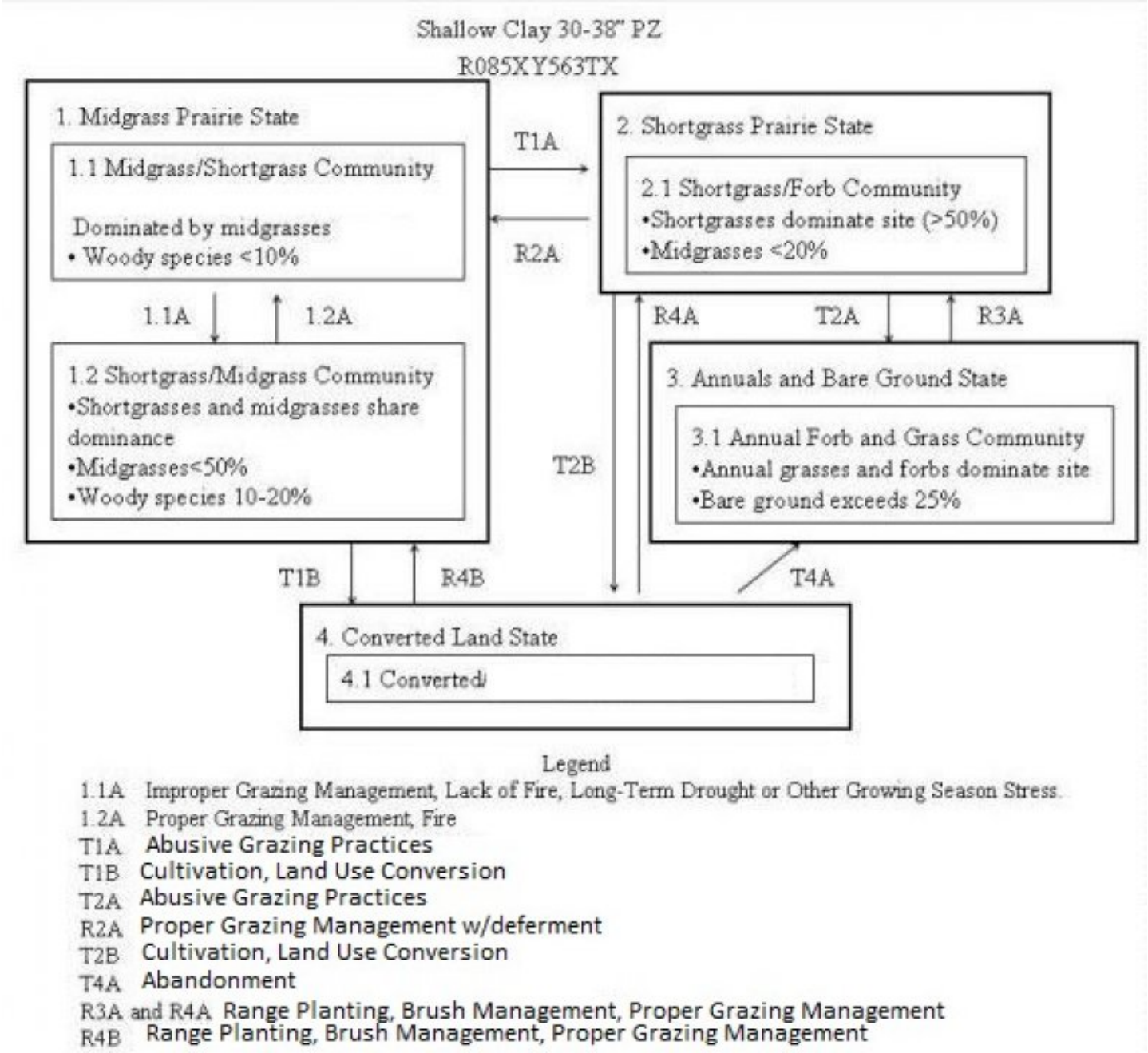
Changes in plant communities and vegetation states on the Shallow Clay site are result of the combined influences of natural events (rainfall, temperature, droughts, etc.) and the accompanying management systems implemented on the area (prescribed fire, grazing management, and brush management).

Rangeland Health Reference Worksheets have been posted for this site on the Texas NRCS website (www.tx.nrcs.usda.gov) in Section II of the eFOTG under (F) Ecological Site Descriptions (ESDs).

Plant Communities and Transitional Pathways
A state and transition model for the Shallow Clay ecological site is depicted in Figure 1. Thorough descriptions of each state and transition and of each plant community and pathway follow the model. This model is based on available experimental research, field observations, and interpretations by experts. It is likely to change as knowledge increases.

The plant communities will differ across the MLRA due to the naturally occurring variability in weather, soils, and aspect. The biological processes on this site are complex. Therefore, representative values are presented in a land management context. The species lists are representative and are not botanical descriptions of all species occurring, or potentially occurring, on this site. They are not intended to cover every situation or the full range of conditions, species, and responses for the site.

State and transition model



State 1
Midgrass Prairie State - Reference

Dominant plant species

- sideoats grama (*Bouteloua curtipendula*), grass

Community 1.1
Midgrass/Shortgrass Community

The reference plant community for the Shallow Clay ecological site is a midgrass/shortgrass prairie which is the reference plant community. Little bluestem (*Schizachyrium scoparium*) can make up to 25% of the historic climax plant community. In pristine conditions, the site is dominated by sideoats grama (*Bouteloua curtipendula*) with smaller amounts of cane bluestem (*Bothriochloa barbinodis*), silver bluestem (*Bothriochloa laguroides*), Arizona cottontop (*Digitaria californica*), dropseeds (Sporobolus spp.), and vine mesquite (*Panicum obtusum*). Buffalograss (*Bouteloua dactyloides*), curlymesquite (*Hilaria belangeri*), and hairy grama (*Bouteloua hirsuta*) are sub-dominant shortgrasses. Blue grama (*Bouteloua gracilis*) is a minor, part of the historic shortgrass component on this site. Perennial forbs are scattered across the site. Shrubs are a minor component of the plant community. The reference prairie community will transition to the Midgrass/Shortgrass Community (1.2) under the stresses of improper

grazing. The first species to decrease in dominance will be the most palatable and/or least grazing tolerant grasses and forbs (little bluestem, sideoats grama). If improper grazing continues, little bluestem and midgrasses will decrease and shortgrasses such as silver buffalograss and curly mesquite will increase in composition. Less palatable forbs will also increase at this stage. Without fire and/or brush control, woody species on the site will increase. The soils of this site are shallow. Although slopes are shallow, in the absence of plant cover and litter, the soil is subject to water and wind erosion. Bare soil composes less than 10 percent of ground cover. Plant basal cover and litter make up the remainder of the ground cover.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1009	1849	2690
Forb	224	336	448
Shrub/Vine	112	168	224
Total	**1345**	**2353**	**3362**

Figure 10. Plant community growth curve (percent production by month). TX6017, Midgrass/Shortgrass Prairie Community. Midgrasses and Shortgrasses dominate the site with forbs and less than ten percent woody canopy..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	2	18	23	17	6	4	16	6	3	2

Community 1.2
Shortgrass/Midgrass Community

The Shortgrass/Midgrass Community (1.2) typically results from improper cattle grazing management over a long period of time. Indigenous or invading woody species may increase on the site (with or without fire). When this community is continually overgrazed, the community crosses a threshold to the Shortgrass Prairie State (2.0). Sideoats grama declines because of disturbance or neglect as a result of uncontrolled grazing, lack of fire, extended severe drought conditions, or other factors. Shortgrasses such as buffalograss and curlymesquite, dominate the site along with midgrasses such as silver bluestem, dropseeds, and slim and rough tridens. Threeawns and Texas grama increase significantly. More annual grasses and forbs begin to appear on the site. Mesquite, lotebush, pricklypear, and tasajillo begin to invade from adjacent sites and the shrub canopy begins to gradually increase. Shrub and tree species will encroach because overgrazing by livestock has reduced grass cover, exposed more soil, and reduced grass fuel for fire. Heavy continuous grazing will reduce plant cover, litter, and mulch. Bare ground will increase and expose the soil to erosion. Litter and mulch will move off-site as plant cover declines. Until the Shortgrass/Midgrass Community (1.2) crosses the threshold into the Shortgrass Prairie State (2), this community can be managed back toward the Midgrass/Shortgrass Community (1.1) through the use of cultural practices including prescribed grazing, prescribed burning, and strategic brush control. It may take several years to achieve this transition, depending upon climate and the aggressiveness of the treatment.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	897	1625	2354
Forb	224	336	448
Shrub/Vine	112	168	224
Total	**1233**	**2129**	**3026**

Figure 12. Plant community growth curve (percent production by month). TX6019, Shortgrass/Midgrass Community. This plant community has short and midgrasses with ten to fifteen percent canopy woody plants..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	8	20	25	20	5	3	10	4	1	1

Pathway 1.1A
Community 1.1 to 1.2

The Midgrass/Shortgrass Community will shift to a Shortgrass/Midgrass Community when there is continued growing season stress on warm-season perennial midgrass species. These stresses include extended drought periods as well as improper grazing management resulting from excessive stocking rate, insufficient critical growing season deferment, excess intensity of defoliation, repeated, long-term growing season defoliation, long-term drought, and/or other repeated critical growing season stress. The driver for community shift 1.1A is uncontrolled grazing.

Pathway 1.2A
Community 1.2 to 1.1

The Shortgrass/Midgrass Community will return to the Midgrass/Shortgrass Community with proper grazing management with proper stocking rates, sufficient critical growing season deferment, and proper grazing intensity. Favorable moisture conditions and prescribed fire will accelerate this transition. The driver for community shift 1.2A is proper grazing management.

Conservation practices

Prescribed Burning
Prescribed Grazing

State 2
Shortgrass Prairie State

Dominant plant species

- buffalograss (*Bouteloua dactyloides*), grass

Community 2.1
Shortgrass/Forb Community

This Shortgrass/Forb Community (2.1) is the result of prolonged periods of damaging disturbances and neglect which may include continuous abusive grazing and total lack of prescribed fire or brush management. The decline may be exacerbated by extended drought conditions. Perennial shortgrasses, including buffalograss, curlymesquite, and threeawns dominate the site along with annual grasses and annual forbs such as broomweed (*Amphiachyris dracunculoides*). Invading shrubs such as mesquite, lotebush, and pricklypear increase in density and canopy, but their growth habit is stunted because of shallow soils, limited rooting depth, and lack of available moisture. A few individual plants of sideoats grama and Arizona cottontop remain in isolated areas, but silver bluestem, dropseeds, and white tridens are the most common midgrasses. Without some form of brush control, scattered woody plants (mesquite and prickly pear) will invade the site. Unpalatable woody species will increased in size and density up to about 30%. Honey mesquite and prickly pear are increasers on the site. Potential exists for soils to erode to the point that irreversible damage may occur. If soil-holding herbaceous cover decreases to the point that soils are no longer stable, the A and B soil horizons will erode. This is a critical shift in the ecology of the site. Once the A horizon has eroded, the hydrology, soil chemistry, soil microorganisms, and soil physics are altered to the point where intensive restoration is required to restore the site to another state or community. Simply changing management (improving grazing management, or controlling brush) cannot create sufficient change to restore the site within a reasonable time frame.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	673	953	1233
Forb	224	336	448
Shrub/Vine	112	168	224
Total	**1009**	**1457**	**1905**

Figure 14. Plant community growth curve (percent production by month). TX6153, Shortgrass/Forbs Community. Shortgrass/Annuals/Mesquite and Shrubs – buffalograss, curly-mesquite, broomweed, annual forbs and grasses, mesquite, lotebush along with forbs..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	8	20	25	20	5	3	10	4	1	1

State 3
Annuals and Bare Ground State

Dominant plant species

- prairie threeawn (*Aristida oligantha*), grass

Community 3.1
Annual Forbs/Grasses Community

Continued lack of fire and brush management along with abusive grazing results in a plant community dominated by annual forbs and grasses. The decline may be exacerbated by extended drought conditions. Annual forbs such as broomweed are abundant. Stunted mesquite, lotebush, and pricklypear are scattered across the site. In the lowest stages of degradation, there is a significant amount of bare ground, and scalded areas are obvious. Some of the scalds are the result of geologic erosion while others are the result of long-term abuse and mismanagement. This plant community is a terminal state that will not return to historic plant communities because of total degradation of the soil, and complete loss of most of the higher successional native plant species. At its most extreme, this community is sparsely vegetated, occasional woody plants species with understory dominated by low production annual grasses and forbs. As the grassland vegetation declines, more soil is exposed, leading to erosion. Due to the shallow depth, erosion can be severe.

Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	224	448	673
Forb	224	336	448
Shrub/Vine	112	168	224
Total	**560**	**952**	**1345**

Figure 16. Plant community growth curve (percent production by month). TX6027 Shortgrass/Annuals/Mesquite and Shrubs – buffalograss, curlymesquite, broomweed, annual forbs and grasses, mesquite, lotebush..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	8	20	25	20	5	3	10	4	1	1

State 4
Converted Land State

Dominant plant species

- Bermudagrass (*Cynodon dactylon*), grass

Community 4.1
Converted Land Community

The soils of this site are poorly suited to cultivation or conversion to pastureland because of poor soil-moisture-plant relationship, shallow root zones, and moderate slopes that are susceptible to erosion. A small amount of this site has been cultivated in the past, but very few acres are still planted to annual crops. Those limited areas of cropland remaining are planted to wheat or forage sorghum, but yields are usually low. King Ranch bluestem has been seeded on some areas that were formerly cropland. Most of the acres of this site that were cultivated in the past have been abandoned because of very low yields and poor economics. Abandoned croplands and reseeded areas tend to revert back to a more natural state through the process of secondary succession. This is a very slow process that takes decades or centuries dependent on the status of the area at the time it is abandoned. The first plants to establish are annual forbs and grasses followed by early successional shortgrasses and midgrasses. If managed properly, some of these abandoned areas may eventually begin to approximate the diversity and complexity of the historic Shallow Clay ecosystem. Midgrasses and perennial forbs may begin to establish if the area is carefully managed. However, it is highly unlikely that abandoned lands can ever return to climax vegetation within a reasonable period of time.

Table 9. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	504	729	953
Forb	336	280	224
Shrub/Vine	56	112	168
Total	**896**	**1121**	**1345**

Figure 18. Plant community growth curve (percent production by month). TX6104, Introduced Pasture Seeding. Grass species such as bermudagrass, kleingrass, old world bluestems and other introduced grassland species are planted..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	2	18	23	17	6	4	16	6	3	2

Transition T1A
State 1 to 2

The transition to the Shortgrass Prairie State occurs when there is an absence of proper grazing management and fire. The driver for Transition T1A is abusive grazing, especially during extended drought periods.

Transition T1B
State 1 to 4

The soils associated with the Shallow clay site are not well-suited to cultivation or conversion to introduced pasture. However, some sites have been cultivated or planted to introduced species. The driver for Transition T1B from the Midgrass Prairie State to the Converted State is cultivation or seedbed preparation followed by the planting of annual crops, introduced grasses, or commercially available native species. This may be a terminal state because the native vegetation has been eliminated and the soil has been permanently altered by mechanical methods.

Restoration pathway R2A
State 2 to 1

Restoration of the Shortgrass Prairie State to the Midgrass Prairie State can be achieved through proper grazing management, prescribed burning, brush management (if needed to remove encroaching shrubs), and range planting (if needed to restore primary native midgrasses). The driver for Restoration Pathway R2A is proper grazing

management based on proper stocking rates and deferment during critical periods.

Conservation practices

Brush Management
Prescribed Burning
Range Planting
Prescribed Grazing

Transition T2A
State 2 to 3

Abusive grazing, especially in combination with extreme drought, will result in extensive bare ground and a sparse herbaceous plant community dominated by annuals, early successional midgrasses, shortgrasses, and forbs. This is considered a terminal state because of the loss of topsoil at this stage. Restoration is not economically feasible. The driver for Transition T2A is abusive grazing.

Transition T2B
State 2 to 4

The soils associated with the Shallow clay site are not well-suited to cultivation or conversion to introduced pasture. However, some sites have been cultivated or planted to introduced species. The driver for Transition T2B from the Shortgrass Prairie State to the Converted/Abandoned Land State is cultivation or seedbed preparation followed by the planting of annual crops, introduced grasses, or commercially available native species. This is a terminal state because the native vegetation has been eliminated and the soil has been permanently altered by mechanical methods.

Restoration pathway R3A
State 3 to 2

Restoration of the Shortgrass Prairie State (2.0) from the Annuals/*Bare Ground* State (3.0) requires substantial energy input. Mechanical and chemical soil treatments will be required in conjunction with range planting and brush control. Restoration Pathway R3A may be impractical and/or uneconomical with current technology. Chemical or hand brush control in combination with prescribed fire, proper grazing, and favorable growing conditions will be required to maintain the desired plant community if soil and planting challenges can be overcome.

Conservation practices

Brush Management
Prescribed Burning
Range Planting
Prescribed Grazing

Restoration pathway R4B
State 4 to 1

Restoration of the Midgrass Prairie State (1.0) from the Converted/Abandoned Land State (4.0) requires substantial energy input. Mechanical and chemical soil treatments will be required in conjunction with range planting and brush control. Chemical or hand brush control in combination with prescribed fire, proper grazing, and favorable growing conditions will be required to maintain the desired plant community if soil and planting challenges can be overcome.

Conservation practices

Brush Management
Prescribed Burning

Range Planting
Prescribed Grazing

Restoration pathway R4A
State 4 to 2

Restoration of the Shortgrass Prairie State (2.0) from the Converted/Abandoned Land State (4.0) requires substantial energy input. Mechanical and chemical soil treatments will be required in conjunction with range planting and brush control. Chemical or hand brush control in combination with prescribed fire, proper grazing, and favorable growing conditions will be required to maintain the desired plant community if soil and planting challenges can be overcome.

Conservation practices

Brush Management
Prescribed Burning
Range Planting
Prescribed Grazing

Transition T4A
State 4 to 3

Many of the areas that were previously cultivated or planted to introduced grasses or commercially available native species have been abandoned. These areas are characterized by extensive bare ground, and the resulting plant community is almost entirely annual forbs and grasses and early successional grasses referred to as “pioneer plants”. This is considered a terminal state because of the loss of topsoil at this stage. Restoration is not economically feasible.

Additional community tables

Table 10. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Tallgrasses**			0–673	
	little bluestem	SCSC	*Schizachyrium scoparium*	0–673	–
2	**Midgrasses**			336–1345	
	sideoats grama	BOCU	*Bouteloua curtipendula*	336–1345	–
3	**Midgrasses**			336–1345	
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	0–336	–
	silver beardgrass	BOLAT	*Bothriochloa laguroides ssp. torreyana*	56–336	–
	Arizona cottontop	DICA8	*Digitaria californica*	56–224	–
	Texas wintergrass	NALE3	*Nassella leucotricha*	56–224	–
	vine mesquite	PAOB	*Panicum obtusum*	56–224	–
	Reverchon's bristlegrass	SERE3	*Setaria reverchonii*	56–224	–
	Drummond's dropseed	SPCOD3	*Sporobolus compositus var. drummondii*	56–224	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–112	–
	Texas cupgrass	ERSE5	*Eriochloa sericea*	0–112	–

4	**Mid/Shortgrasses**			168–504	
	buffalograss	BODA2	*Bouteloua dactyloides*	56–504	–
	curly-mesquite	HIBE	*Hilaria belangeri*	56–504	–
	blue grama	BOGR2	*Bouteloua gracilis*	0–336	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	56–336	–
	tumble windmill grass	CHVE2	*Chloris verticillata*	0–168	–
	Hall's panicgrass	PAHAH	*Panicum hallii var. hallii*	0–168	–
	white tridens	TRAL2	*Tridens albescens*	0–168	–
	slim tridens	TRMUE	*Tridens muticus var. elongatus*	0–168	–
	slim tridens	TRMUM	*Tridens muticus var. muticus*	0–168	–
	Texas grama	BORI	*Bouteloua rigidiseta*	0–56	–
	sedge	CAREX	*Carex*	0–56	–
	purple threeawn	ARPU9	*Aristida purpurea*	0–56	–
	Wright's threeawn	ARPUW	*Aristida purpurea var. wrightii*	0–56	–
Forb					
5	**Forbs**			224–448	
	white heath aster	SYERE	*Symphyotrichum ericoides var. ericoides*	0–168	–
	Engelmann's daisy	ENPE4	*Engelmannia peristenia*	0–168	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–112	–
	white sagebrush	ARLUM2	*Artemisia ludoviciana ssp. mexicana*	0–56	–
	American star-thistle	CEAM2	*Centaurea americana*	0–56	–
	Texas thistle	CITE2	*Cirsium texanum*	0–56	–
	Queen Anne's lace	DACA6	*Daucus carota*	0–56	–
	prairie clover	DALEA	*Dalea*	0–56	–
	purple prairie clover	DAPU5	*Dalea purpurea*	0–56	–
	bundleflower	DESMA	*Desmanthus*	0–56	–
	Leavenworth's eryngo	ERLE11	*Eryngium leavenworthii*	0–56	–
	beeblossom	GAURA	*Gaura*	0–56	–
	curlycup gumweed	GRSQ	*Grindelia squarrosa*	0–56	–
	Indian rushpea	HOGL2	*Hoffmannseggia glauca*	0–56	–
	trailing krameria	KRLA	*Krameria lanceolata*	0–56	–
	plains blackfoot	MELE2	*Melampodium leucanthum*	0–56	–
	blazingstar	MENTZ	*Mentzelia*	0–56	–
	Nuttall's sensitive-briar	MINU6	*Mimosa nuttallii*	0–56	–
	pony beebalm	MOPE	*Monarda pectinata*	0–56	–
	plantain	PLANT	*Plantago*	0–56	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	0–56	–
	Drummond's skullcap	SCDR2	*Scutellaria drummondii*	0–56	–
	fineleaf fournerved daisy	TELI3	*Tetraneuris linearifolia*	0–56	–
	slender greenthread	THSI	*Thelesperma simplicifolium*	0–56	–
	Texas vervain	VEHA	*Verbena halei*	0–56	–
	prairie broomweed	AMDR	*Amphiachyris dracunculoides*	0–56	–

Shrub/Vine					
6	**Shrubs/Vines/Trees**			112–224	
	gum bully	SILA20	*Sideroxylon lanuginosum*	0–224	–
	hackberry	CELTI	*Celtis*	0–224	–
	catclaw acacia	ACGRG3	*Acacia greggii var. greggii*	0–168	–
	yucca	YUCCA	*Yucca*	0–168	–
	lotebush	ZIOB	*Ziziphus obtusifolia*	0–168	–
	Christmas cactus	CYLE8	*Cylindropuntia leptocaulis*	0–112	–
	black prairie clover	DAFR2	*Dalea frutescens*	0–112	–
	Berlandier's wolfberry	LYBE	*Lycium berlandieri*	0–112	–
	pricklypear	OPUNT	*Opuntia*	0–112	–
	honey mesquite	PRGL2	*Prosopis glandulosa*	0–112	–
	clapweed	EPAN	*Ephedra antisyphilitica*	0–56	–

Animal community

Historically, the Shallow Clay site was occasionally utilized by a variety mammals, reptiles, and birds. Several historical references and journals written in the 18th and 19th century by explorers, survey parties, and military expeditions refer to herds of bison, wild cattle, wild horses, and antelope roaming freely across the North Central Prairie and adjacent regions.

Today the site is primarily used by bob-white quail because of the scattered vegetation, amount of open ground, and presence of scattered, low-growing shrubs. The site may be utilized intermittently by deer, dove, several species of grassland birds, and small fur-bearing mammals, but it is not a preferred site for most wildlife because of the relatively low and uniform structure of the vegetation, as well as the lack of trees, shrubs, and forbs. With the exception of quail, most wildlife only utilizes this site incidentally in association with the use of more suitable adjacent sites. Animal species and populations fluctuate as the vegetation cycles through temporary phases and different ecological stages.

Livestock grazing should be controlled by implementing grazing management systems that incorporate frequent and timely deferment periods to prevent abusive grazing.

Hydrological functions

When herbaceous vegetation and ground cover are maintained in a healthy and vigorous status, water infiltration into the soil profile is increased, resulting in less runoff. However, infiltration rates are generally low and permeability is slow. Vegetation on this site is often sparse and interspersed with significant areas of bare ground. Overland water flow can cause significant erosion hazards particularly during intense rainfall periods. A thick, healthy grass cover will improve water quality because it serves as a filter or trap to reduce sediments and pollutants before the water flows offsite.

Water erosion can occur where the site is not protected by vegetation. In the Midgrass Prairie State (1.0) and Shortgrass Prairie State (2.0) grassland vegetation intercepts and utilizes much of the rainfall. In the Annual and *Bare Ground* State (3.0) there is much less vegetation to intercept rainfall and that which strikes the ground may cause erosion due to increase in bare soil. Evaporation losses are higher in the Annuals and *Bare Ground* State (3.0), which when combined with increased runoff and eroded soils, results in less moisture reaching the rooting zone.

As the site transitions away from the Midgrass Prairie State (1.0) the amount of bare ground will increase from essentially about 10% to over 50% in the Annuals and *Bare Ground* State (3.0). Accordingly, infiltration will decline and runoff and erosion will increase. Standing plant cover, litter, and soil organic matter decrease as site transitions from the Midgrass Prairie State (1.0) to the Annuals and *Bare Ground* State (3.0).

Recreational uses

Because of the scarcity of trees and shrubs, the level terrain, characteristics of the soil, and the uniformity of the plant community, recreational use of this site is incidental and is generally associated with recreational use of adjacent sites. This site provides limited opportunities for outdoor activities such as hiking, camping, and horseback riding. Quail and dove hunting offer the most potential for recreation on this site.

Wood products

NA

Other products

NA

Other information

NA

Inventory data references

Information presented was derived from the revised Shallow Clay Range Site, NRCS clipping data, literature, field observations, and personal contacts with range-trained personnel.

References

. 2021 (Date accessed). USDA PLANTS Database. http://plants.usda.gov.

Bailey, V. 1905. Biological Survey of Texas. North American Fauna 25:1–222.

Other references

Other References:
1. Archer, S. 1994. Woody plant encroachment into southwestern grasslands and savannas: rates, patterns and proximate causes. In: Ecological implications of livestock herbivory in the West, pp. 13-68. Edited by M. Vavra, W. Laycock, R. Pieper. Society for Range Management Publication, Denver, CO.
2. Archer, S. and F.E. Smeins. 1991. Ecosystem-level Processes. Chapter 5 in: Grazing Management: An Ecological Perspective. Edited by R.K. Heitschmidt and J.W. Stuth. Timber Press, Portland, OR.
3. Bestelmeyer, B.T., J.R. Brown, K.M. Havstad, R. Alexander, G. Chavez, and J.E. Herrick. 2003. Development and use of state-and-transition models for rangelands. J. Range Manage. 56(2): 114-126.
4. Brown, J.R. and S. Archer. 1999. Shrub invasion of grassland: recruitment is continuous and not regulated by herbaceous biomass or density. Ecology 80(7): 2385-2396.
5. Foster, J.H. 1917. Pre-settlement fire frequency regions of the United States: a first approximation. Tall Timbers Fire Ecology Conference Proceedings No. 20.
6. Gould, F.W. 1975. The Grasses of Texas. Texas A&M University Press, College Station, TX. 653p.
7. Hamilton, W. and D. Ueckert. 2005. Rangeland Woody Plant Control: Past, Present, and Future. Chapter 1 in: Brush Management: Past, Present, and Future. pp. 3-16. Texas A&M University Press.
8. Scifres, C.J. and W.T. Hamilton. 1993. Prescribed Burning for Brush Management: The South Texas Example. Texas A&M University Press, College Station, TX. 245 p.
9. Smeins, F., S. Fuhlendorf, and C. Taylor, Jr. 1997. Environmental and Land Use Changes: A Long Term Perspective. Chapter 1 in: Juniper Symposium 1997, pp. 1-21. Texas Agricultural Experiment Station.
10. Stringham, T.K., W.C. Krueger, and P.L. Shaver. 2001. State and transition modeling: and ecological process approach. J. Range Manage. 56(2):106-113.
11. Texas Agriculture Experiment Station. 2007. Benny Simpson's Texas Native Trees (http://aggie-horticulture.tamu.edu/ornamentals/natives/).
12. Texas A&M Research and Extension Center. 2000. Native Plants of South Texas

(http://uvalde.tamu.edu/herbarium/index.html).
13. Thurow, T.L. 1991. Hydrology and Erosion. Chapter 6 in: Grazing Management: An Ecological Perspective. Edited by R.K. Heitschmidt and J.W. Stuth. Timber Press, Portland, OR.
14. USDA/NRCS Published Soil Surveys Soil Surveys for various counties in the Grand Prairie Major Land Resource Area.
15. USDA, NRCS. 1997. National Range and Pasture Handbook.
16. USDA, NRCS. 2007. The PLANTS Database (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.
17. Vines, R.A. 1984. Trees of Central Texas. University of Texas Press, Austin, TX.
18. Vines, R.A. 1977. Trees of Eastern Texas. University of Texas Press, Austin, TX. 538 p.
19. Wright, H.A. and A.W. Bailey. 1982. Fire Ecology: United States and Southern Canada. John Wiley & Sons, Inc.

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Reviewers:
Lem Creswell, RMS, NRCS, Weatherford, Texas
Kent Ferguson, RMS, NRCS, Temple, Texas
Justin Clary, RMS, NRCS, Temple, Texas

Contributors

Jack Alexander, Synergy Resource Solutions, Inc, Belgrade, Montana And Dan Caudle, DMC Natural Resource Management, Weatherford, Texas
PES Edits by Colin Walden, Stillwater Soil Survey Office

Approval

Bryan Christensen, 9/21/2023

Acknowledgments

Site Development and Testing Plan:

Future work, as described in a Project Plan, to validate the information in this Provisional Ecological Site Description is needed. This will include field activities to collect low, medium and high intensity sampling, soil correlations, and analysis of that data. Annual field reviews should be done by soil scientists and vegetation specialists. A final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce the final document. Annual reviews of the Project Plan are to be conducted by the Ecological Site Technical Team.

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	Lem Creswell, RMS, NRCS, Weatherford, Texas
Contact for lead author	817-596-2865
Date	09/17/2007
Approved by	Bryan Christensen

Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None.

2. **Presence of water flow patterns:** Water flow patterns are common and follow old stream meanders. Deposition or erosion is uncommon for normal rainfall but may occur during intense rainfall events.

3. **Number and height of erosional pedestals or terracettes:** Pedestals or terracettes would have been uncommon for this site.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Expect no more than 10% bare ground randomly distributed throughout in small and non-connected areas.

5. **Number of gullies and erosion associated with gullies:** Some gullies may be present on side drains into perennial and intermittent streams. Gullies should be vegetated and stable.

6. **Extent of wind scoured, blowouts and/or depositional areas:** None.

7. **Amount of litter movement (describe size and distance expected to travel):** Under normal rainfall, little litter movement should be expected; however, litter of all sizes may move long distances.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface under HCPC is resistant to erosion. Stability class range is expected to be 5-6.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** 0 to 6 inches; brown clay loam; weak fine subangular blocky and granular structure; hard, friable; few fine strongly cemented calcium carbonate concretions; moderately alkaline; calcareous; abrupt smooth boundary.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** The savannah of midgrasses, shortgrasses, shrubs and forbs having adequate litter and little bare ground can provide for maximum infiltration and little runoff under normal rainfall events.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** No evidence of compaction.

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant: Warm-season tallgrasses >>

    Sub-dominant: Warm-season midgrasses > Cool-season midgrasses > Trees >

    Other: Warm-season shortgrasses > Forbs > Shrubs/Vines

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Grasses due to their growth habit will exhibit some mortality and decadence, though very slight.

14. **Average percent litter cover (%) and depth (in):** Litter is primarily herbaceous.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 1000 to 2500 pounds per acre.

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** Ashe juniper, Honey mesquite, Pricklypear, Bermudagrass, Johnsongrass, King Ranch bluestem.

17. **Perennial plant reproductive capability:** All perennial plants should be capable of reproducing, except during periods of prolonged drought conditions, heavy herbivory, and wildfires.